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IVER P. COOPER

April 27, 2000

Hon. Assistant Commissioner for Patents
Box Patent Appln
Washington, D.C. 20231

RE: New Continuation Patent Application in U.S.
Applicant(s): Lars-Olof OLOFSSON et al.
Title: LOAD INDICATOR
Atty's Docket: OLOFSSON=1

Sir:

Attached herewith is the above-identified continuation application for Letters Patent including:

[X] Specification (8 pages), claims (2 pages) and abstract (1 page)
[X] 3 Sheets of Drawings (Figures 1-3)
[X] Formal [ ] Informal
[X] Declaration and Power of Attorney (2 pages)
[X] Newly executed [] Copy from prior application no.
[X] Preliminary Amendment
[X] Information Disclosure Statement with 1449 and four references
[ ] A verified statement to establish small entity status under 37 CFR §1.9 and 37 CFR §1.27 (1 page(s))
[X] A check in the amount of $ 690.00 (check no. 25599) to cover:
[X] The filing fee calculated as follows:

CLAIMS AS FILED				
FOR	NUMBER FILED	NUMBER EXTRA	RATE	BASIC FEE $ 690.00
TOTAL CLAIMS	10 - 20	= 0	x 18	--0
INDEPENDENT CLAIMS	1 - 3	= 0	x 78	--0
[ ] Multiple Dependent Claim Presented			+ 260	--
[ ]Reduction of 1/2 for Small Entity				$
TOTAL FILING FEE				$ 690.00

[X] Return Receipt Postcard (in duplicate)

The following statements are applicable:

[X] The benefit under 35 USC §119 is claimed of the filing date of: Application No. 9703952-3 in Sweden on 28 October 1997. A certified copy of which is attached hereto.

[X] The present application is a Continuation of prior application No. PCT/SE98/01909, filed on 22 October 1998.

[X] A copy of Form PCT/IPEA/402 indicating that a demand was timely filed is also attached.

[ ] Amend the specification by inserting before the first line and after the title the sentence:
--This application is a continuation of copending parent application no. , filed .--

[ ] Incorporation By Reference. The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied herewith, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

[ ] Certain documents were previously cited or submitted to the Patent and Trademark Office in the following prior application __, which is relied upon under 35 USC §120. Applicants identify these documents by attaching hereto a form PTO-1449 listing these documents, and request that they be considered and made of record in accordance with 37 CFR §1.98(d). Per Section 1.98(d), copies of these documents need not be filed in this application.

[ ] A verified statement claiming small entity status is enclosed in progenitor application no. _____, filed . Status is still proper and desired. A copy of such small entity statement is attached hereto.

[ ] The undersigned attorney of record hereby revokes the powers of attorney of:

[ ] The undersigned attorney of record hereby appoints associate power of attorney, to prosecute this application and to transact all business in the Patent and Trademark Office in connection therewith to:

[X] The Commissioner is hereby authorized to charge payment of the following additional fees associated with this communication or credit any overpayments to Deposit Account No. 02-4035:

[X] Any additional filing fees required under 37 CFR §1.16.
[X] Any patent application processing fees under 37 CFR §1.17.

[X] The Commissioner is hereby authorized to charge payment of the following fees, based on any paper filed during the pendency of this application or any CPA thereof, to effect any amendment, petition, or other action requested in said paper or credit any overpayments to Deposit Account No. 02-4035:
[X] Any patent application processing fees under 37 CFR §1.17.

[ ] The issue fee set in 37 CFR §1.18 at or before mailing the Notice of Allowance, pursuant to 37 CFR §1.311(b).

[X] Any filing fees under 37 CFR §1.16 for presentation of extra claims.

[X] If a paper is untimely filed in this or any CPA thereof by Applicant(s), the Commissioner is hereby petitioned under 37 CFR. §1.136(a) for the minimum extension of time required to make said paper timely. In the event a petition for extension of time is made under the provisions of this paragraph, the Commissioner is hereby requested to charge any fee required under 37 CFR §1.17 to Deposit Account 02-4035.

[X] The Commissioner is hereby authorized to credit any overpayment of fees accompanying this paper to Deposit Account No. 02-4035.

Respectfully submitted,
BROWDY AND NEIMARK, P.L.L.C.w

By: _____
Roger L. Browdy
Registration No. 25,618

RLB:edg
F:\,A\Awap\olofsson1\pto\continuation transmittal.doc

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Lars-Olof OLOFSSON et al.	)	Art Unit:
IA No.: PCT/SE98/01909	)	Washington, D.C.
IA Filed: 22 October 1998	)	
U.S. App. No.: (Not Yet Assigned)	)	April 27, 2000
National Filing Date: (Not Yet Received)	)	
For: LOAD INDICATOR	)	Docket No.: OLOFSSON=1

PRELIMINARY AMENDMENT

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231
Sir:

Contemporaneous with the filing of this case and prior to calculation of the filing fee, kindly amend as follows:

IN THE SPECIFICATION

After the title please insert the following paragraph:

--CROSS REFERENCE TO RELATED APPLICATION

The present application is a continuation of PCT/SE98/01909, filed 22 October 1998, the entire contents of which being hereby incorporated herein by reference. --

IN THE CLAIMS

Claim 5, lines 1-2, delete "any one of claims 1-4", and insert therefor --claim 1--.

Claim 7, lines 1-2, delete "any one of claims 1-4", and insert therefor --claim 1--.

Claim 8, lines 1-2, delete "any one of claims 1-4", and insert therefor --claim 1--.

Claim 9, lines 1-2, delete "any one of claims 1-8", and insert therefor --claim 1--.

Claim 10, lines 1-2, delete "any one of claims 1-8", and insert therefor --claim 1--.

REMARKS

The above amendment to the specification is being made to insert reference to the PCT application of which the present case is a U.S. national stage. The above amendments to the claims are being made in order to eliminate any properly multiply dependent claims, for the purpose of reducing the filing fee. Please enter this amendment prior to calculation of the filing fee in this case.

Favorable consideration and allowance are earnestly solicited.

Respectfully submitted,
BROWDY AND NEIMARK, P.L.L.C.
Attorneys for Applicant

By: [signature]
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LOAD INDICATOR

The present invention relates generally to a load indicator or load monitor for an electric motor, comprising a first means for repeated determination of the motor load, a second means for comparing the current motor load, as determined by the first means, with a preset load limit, and a third means for indicating that the current motor load exceeds the load limit.

Load indicators of this type are well known and enable, for instance, switching-off of the motor in case of overload or underload. US-A-4,333,118 discloses a load indicator, which determines the motor load as the product of applied voltage and supplied current reduced by a value which is proportional to the absolute value of the supplied current. This difference can, by a suitable proportionality factor, be made to well represent the power emitted by the motor, i.e. the difference between supplied power and lost power in the motor.

In the prior-art load indicators, the presetting of the load limit or limits is relatively time-consuming, and therefore an object of the present invention is to improve the load indicators in this respect.

This object is achieved by the load indicator of the type stated by way of introduction being given the features that appear from appended claim 1. Preferred embodiments of this load indicator are evident from the dependent claims.

According to the invention, the load indicator thus has a means for initiating a presetting of a load limit as the current motor load changed by a predetermined deviation value stored in the load indicator. This initiating means is adapted to be actuated as the motor runs in normal operation.

To achieve the desired setting of the load limit or limits, it is thus only necessary for the motor to

be started and made to work in approximately normal conditions in order that an actuation of the initiating means should result in a presetting of the load limit or limits.

The invention is advantageously applicable to such a load indicator as described in the above-mentioned US-A-4,333,118, but it can also be used in load indicators which repeatedly determines a value, which in some other way represents the motor load, for instance the supplied power, the torque of the motor, the current of the motor or the phase shift between motor voltage and motor current.

The deviation value may consist of one value for a maximum load limit and of another value for a minimum load limit. Each deviation value can be represented or stored in one of many different forms, e.g. as a percentage, which multiplied by the value of the nominal power of the motor yields the actual deviation value. An alternative form of storage can be a percentage, which multiplied by the value of the current load yields the actual deviation value. The deviation value can also be stored as a fixed value.

It is also possible to use, for example, two deviation values which represent deviation in the same direction from the motor load in normal operation. The smaller of these can then be used as an internal alarm or prealarm while the greater of the two deviation values is the main alarm and determines when it is time for an external alarm indication or even switching-off of the motor to occur.

An embodiment of a load indicator according to the invention will now be described in more detail with reference to the accompanying drawings, in which

Fig. 1 is a schematic block diagram of an embodiment of an inventive load indicator,

Fig. 2 is a flow diagram of the presetting of alarm limits in an embodiment of a load indicator according to the invention, and

Figs 3 and 4 are flow diagrams of the alarm function in an embodiment of a load indicator according to the invention.

In the block diagram shown in Fig. 1, a processor constitutes a central processing unit CPU in the load indicator. The central processing unit CPU has two inputs which are connected to an input stage II for current and to an input stage IU for voltage respectively. Moreover the central processing unit CPU has an output for two relays L1 and L2 and an analog output, which via an isolating stage IS is connected to a drive stage DS. Finally, the central processing unit CPU has bi-directional connections with, on the one hand, a memory unit ME and, on the other hand, a programming and presentation unit PP.

The load indicator has for its power supply also a mains supply circuit ND which has a motor voltage as supply voltage and separate voltage and earth connections for the drive step DS and the other units.

The input stage II for current is connected in a manner known per se to a current transformer which encloses one of the supply lines to the motor which the load indicator should monitor. Also the input stage IU for voltage is connected in a manner known per se to the supply lines of the motor.

The programming and presentation unit PP comprises on the one hand a screen for character presentation and, on the other hand, a number of keys for inputting instructions to the central processing unit CPU. In particular one of these keys is a key T for starting an automatic setting of load limits or alarm levels, as will be described in more detail in the following.

The processor in the load indicator in Fig. 1 passes the process steps illustrated in Fig. 2 when said key

for automatic setting of alarm levels is pressed, which should take place when the motor runs in normal operation.

In a first step 1, it is then detected whether alarm limits for overload or alarm limits for underload are to be set. If a maximum limit, i.e. a limit value of overload, is to be set, the current load is detected, and to this value there is added in a step 2 a deviation or margin value which is stored in the load indicator, e.g. in the memory unit ME, and represents the permissible maximum deviation above normal load, i.e. the load in normal operation, which does not require an alarm indication to be activated. The obtained sum, which thus is the maximum limit value, is in the next step 3 compared with the nominal power of the motor. If the maximum limit value is greater than 125% of the nominal power, the maximum limit value is set in a step 4 to equal 125% of the nominal power while otherwise the obtained sum is used as the maximum limit value.

The value of the current load, the deviation value and the nominal power are suitably calculated in per cent of the latter.

Subsequently, a pre-alarm level is set in essentially the same fashion as the main alarm level. Thus, the current load is detected, and to this value there is added in a step 5 a margin value which is stored in the load indicator and represents the deviation corresponding to a pre-alarm level above normal load before activation of a pre-alarm indication. The obtained sum, which thus is the pre-alarm limit value, is compared in a next step 6 with the nominal power. If the pre-alarm limit value is greater than 125% of the nominal power, the pre-alarm limit value is set in a step 7 to equal 125% of the nominal power while otherwise the obtained sum is used as the pre-alarm limit value.

If the central processing unit CPU in the first step 1 detects that an alarm limit for underload is to be set,

the current load is compared with the permissible maximum deviation in a step 8. If the current load is smaller than the permissible maximum deviation, the main limit value of underload is set to equal zero in a step 9 while otherwise the obtained difference value is introduced as a main alarm limit value in a step 10.

In the following, a pre-alarm value of underload is set in the same manner as the main alarm value of underload. Thus, the current load is compared with the deviation in the pre-alarm limit in a step 11. If the current load is smaller than the pre-alarm limit deviation, the pre-alarm limit value of underload is set to equal zero in a step 12 while otherwise the obtained difference value between the current load and the pre-alarm limit deviation is introduced as a pre-alarm limit value in a step 13.

In an alternative embodiment, alarm limits can be set for maximum load as well as minimum load, for instance, by the loops in Fig. 2 for maximum load and minimum load, respectively, being passed consecutively and not being mutually excluding.

It is also obvious that all values can be calculated in per cent of the nominal power, as is the case in Fig. 2, but they can also be calculated in other ways. Thus, the deviation values can be calculated in per cent of the current load or on some other relative scale. It is also possible to use values expressed on some actual scale, which may concern, for instance, power, torque or current.

The mode of operation of the above-described load indicator, after the setting of alarm limits in the manner that has also been described above, will now be described with reference to Figs 3 and 4. For the sake of simplicity, only the main alarm function will be described since the pre-alarm function is essentially analogous thereto.

The central processing unit CPU calculates a value of the current load for each period of the alternating current that is supplied to the alternating current motor monitored by the load indicator. This is illustrated in the flow diagram in Fig. 4, according to which the motor current and the motor voltage are sampled alternatingly, for instance 32 times during an alternating current period, and the sampled values are used to prepare a corresponding number of partial power values, which when summed up yield a value of the power supplied during a period of the alternating current. A timer 14 generates the sampling frequency, e.g. 1600 Hz, and an analog to digital converter 15 generates a digital sample value, which alternatingly represents a current value and a voltage value. In a step 16, it is thus decided if the central processing unit CPU in a step 17 should use the sample value as a voltage value, or in a step 18 use it as a current value. In step 18, the power supplied during the period is calculated by summing up the products, associated with the period, of voltage sample values and associated current sample values, each of the latter being taken as the average value of current sample values immediately before and after the respective voltage sample values.

In steps 17 and 18, the current sample values and the voltage sample values are added in a longer time interval than a period of the alternating current for the central processing unit CPU, with a suitable scaling of the cumulative values, to be able to present the current motor current and the current motor voltage on the display of the programming and presentation unit PP.

As shown in Fig. 3, the power cumulative value produced for each period is used to determine whether a preset alarm limit has been exceeded or not.

In a step 19, it is thus decided whether a new period has started. If this is the case, the power cumulative value is scaled for the preceding period in a

suitable fashion in a step 20, and the power cumulative value in step 18 is cleared. In a subsequent step 21, a digital filtration occurs, i.e. a certain equalising of consecutive power cumulative values, and in a step 22 an update of the analog output signal occurs on the output of the drive stage DS.

In a next step 23, the measured power cumulative value is compared with the preset limit value for activating the main alarm of the load indicator.

If the measured power cumulative value is not outside the main alarm limit, it is checked in a step 24 whether the main alarm is activated. If this is the case, the main alarm is switched off in a step 25 whereas, if the main alarm is not activated, a timer 26 determining the main alarm delay is cleared. The central processing unit CPU is thus arranged to release a main alarm only when the measured power for a predetermined period of time has been outside the main alarm limit, i.e. after a predetermined time delay.

If the measured power cumulative value, however, is outside the main alarm limit, it is checked in a step 27 whether the main alarm is activated. If this is the case, the operation cycle is terminated for the present period while otherwise a check is made in a step 28 whether the delay time of the main alarm has expired. If this is the case, the main alarm is activated in a step 29 while in the opposite case a check is made in a step 30 whether the delay time has begun to run. If the delay time has begun to run, the operation cycle is terminated for the present period. In the opposite case, a timer is started in a step 31 for determination of the end of the delay time.

The above-described operation cycle is passed by the central processing unit CPU once for each period of alternating current to the motor. In between the central processing unit CPU processes similar operation cycles for one or more pre-alarms or for another main alarm

which may concern underload, if the above-described main alarm is assumed to concern overload. In addition, the central processing unit CPU processes further operation cycles for other routines, such as key processing.

When activating a pre-alarm, for instance the output to the relay L1 can be activated, thereby obtaining a visual indication of this condition. Correspondingly, the relay L2 can be activated when a main alarm is released, whereby another visual indication can be obtained or the motor is switched off.

A person skilled in the art realises that several modifications of the above-described embodiment of a load indicator are feasible within the scope of the invention as defined by the appended claims. For example, the central processing unit CPU may comprise possibilities of afterwards manually setting alarm limits which differ from the alarm limits which are quickly settable by applying the inventive technique using deviation values. It is further obvious that the invention can be accomplished with different amounts of software and hardware, i.e. several of the means included may consist completely of software, partly of software and partly of hardware, or completely of hardware.

CLAIMS

1. A load indicator for an electric motor, comprising a first means (II, IU, CPU) for repeated determination of the motor load, a second means (CPU) for comparing the current motor load, as determined by the first means, with a preset load limit, and a third means (CPU, PP) for indicating that the current motor load exceeds the load limit, c h a r a c t e r i s e d by a means (T, CPU) for initiating a presetting of the load limit as the current motor load changed by a predetermined deviation value stored in the load indicator, said initiating means being adapted to be actuated as the motor runs in normal operation.

2. A load indicator as claimed in claim 1, c h a r a c t e r i s e d in that the deviation value is stored as a percentage which, multiplied by the nominal power of the motor, yields the actual deviation value.

3. A load indicator as claimed in claim 1, c h a r a c t e r i s e d in that the deviation value is stored as a percentage which, multiplied by the current load, yields the actual deviation value.

4. A load indicator as claimed in claim 1, c h a r a c t e r i s e d in that deviation value is stored as a fixed value.

5. A load indicator as claimed in any one of claims 1-4, c h a r a c t e r i s e d in that the initiating means (T, CPU) is adapted to preset two deviation values which represent deviations in the same direction from the motor load in normal operation.

6. A load indicator as claimed in claim 5, c h a r a c t e r i s e d by a means (1) for determining the direction of deviation.

7. A load indicator as claimed in any one of claims 1-4, c h a r a c t e r i s e d in that the initiating means (T, CPU) is adapted to preset two deviation values

which represent deviations in opposite directions from the motor load in normal operation.

8. A load indicator as claimed in any one of claims 1-4, c h a r a c t e r i s e d in that the initiating means (T, CPU) is adapted to preset four deviation values, of which two represent different deviations in a first direction from the motor load in normal operation and two represent different deviations in a second direction, opposite to the first direction, from the motor load in normal operation.

9. A load indicator as claimed in any one of claims 1-8, c h a r a c t e r i s e d in that the first means (II, IU, CPU) is adapted to determine the current motor load as the supplied power reduced by a value that represents the lost power of the motor.

10. A load indicator as claimed in any one of claims 1-8, c h a r a c t e r i s e d in that the first means (II, IU, CPU) is adapted to determine the current motor load as the supplied power.

ABSTRACT OF THE DISCLOSURE

A load indicator for an electric motor, comprising a first means (II, IU, CPU) for repeated determination of the motor load, a second means (CPU) for comparing the current motor load, as determined by the first means, with a preset load limit, and a third means (CPU), PP) for indicating that the current motor load exceeds the load limit. Moreover, a meant (T, CPU) is arranged to initiate a presetting of the load limit. This means is adapted to be actuated, when the motor runs in normal operation, for presetting of the load limit as the current motor load changed by a predetermined deviation value stored in the load indicator.

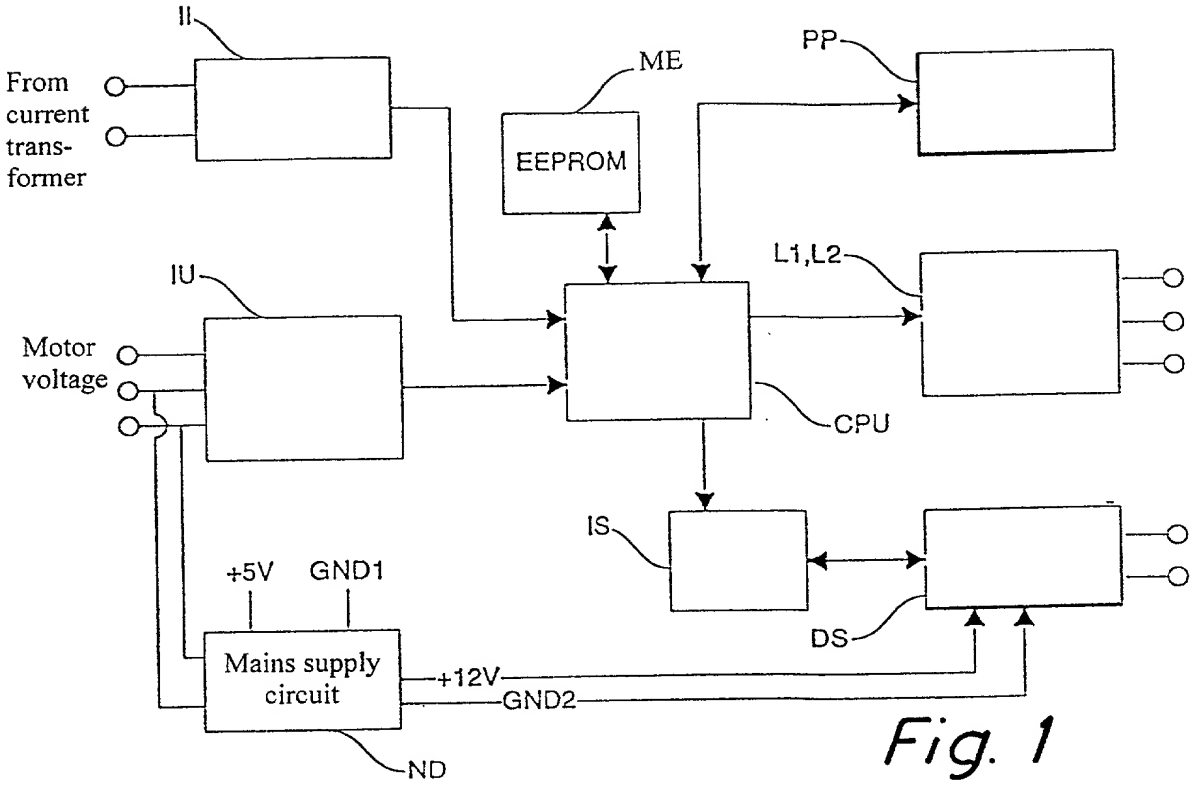
II
From current trans-former
ME
EEPROM
PP
IU
Motor voltage
L1,L2
CPU
IS
DS
+5V
GND1
Mains supply circuit
+12V
GND2
ND

Fig. 1

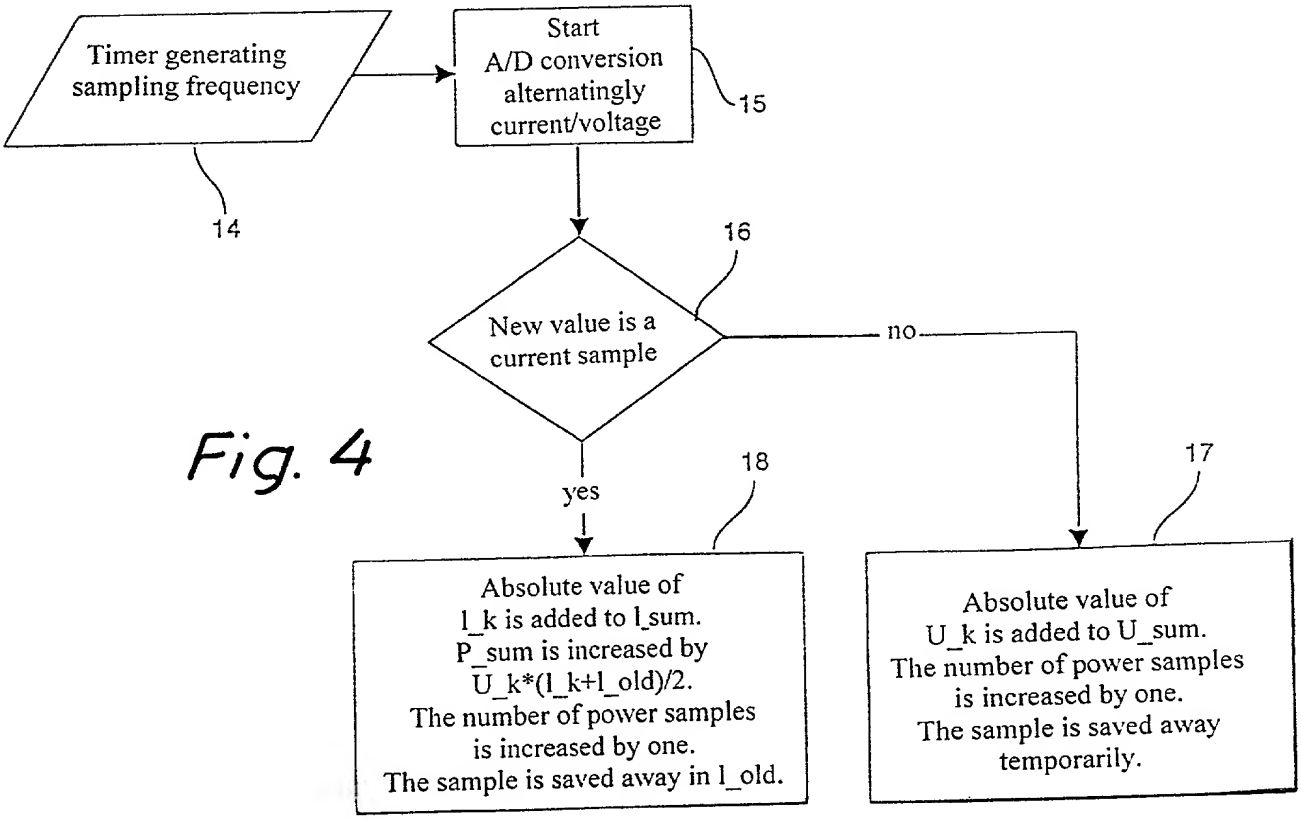
Timer generating sampling frequency
14
Start A/D conversion alternatingly current/voltage
15
16
New value is a current sample
no
yes
18
17
Absolute value of I_k is added to I_sum. P_sum is increased by U_k*(I_k+I_old)/2. The number of power samples is increased by one. The sample is saved away in I_old.
Absolute value of U_k is added to U_sum. The number of power samples is increased by one. The sample is saved away temporarily.

Fig. 4

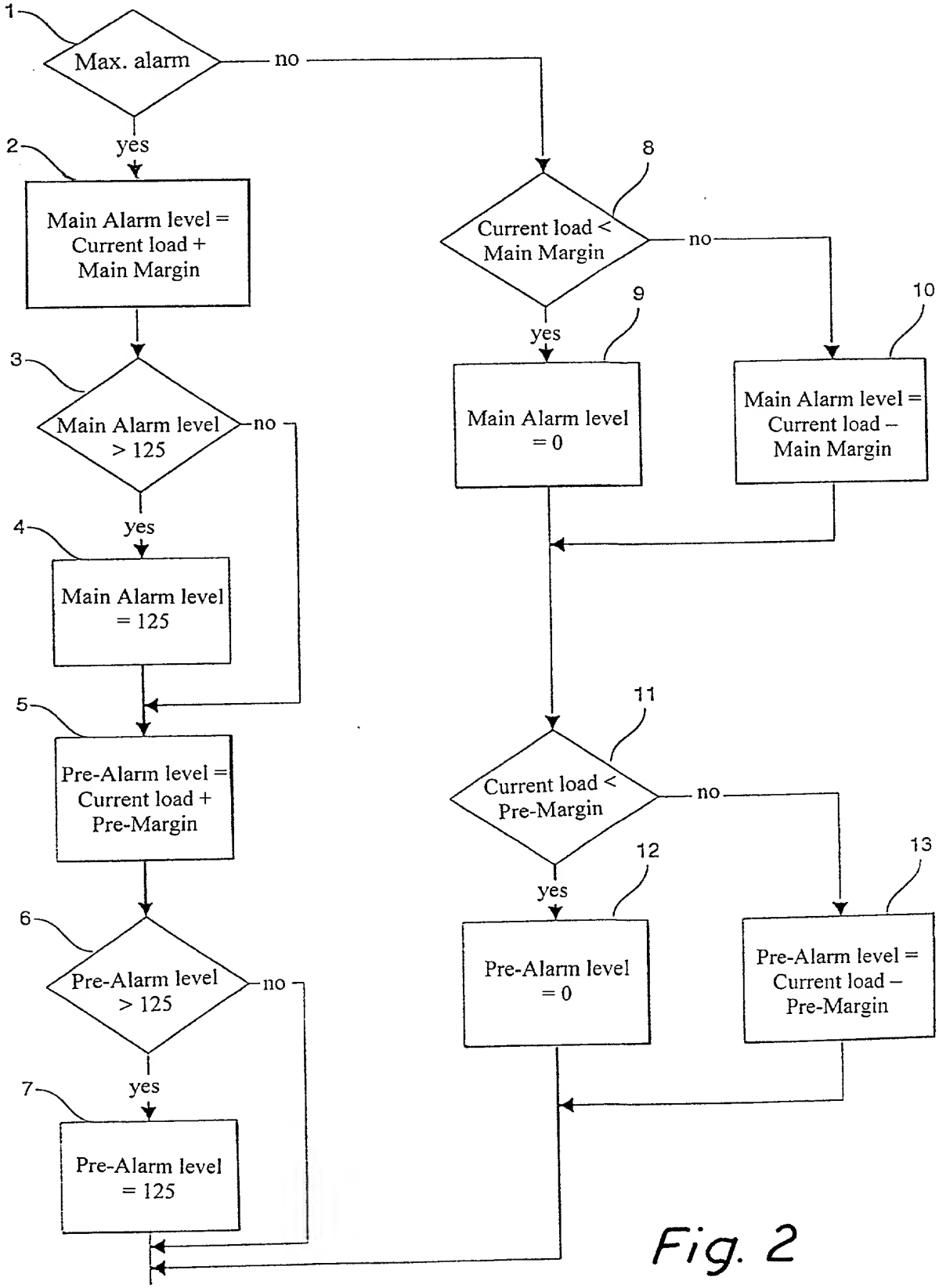
1
Max. alarm
no
yes
2
Main Alarm level = Current load + Main Margin
3
Main Alarm level > 125
no
yes
4
Main Alarm level = 125
5
Pre-Alarm level = Current load + Pre-Margin
6
Pre-Alarm level > 125
no
yes
7
Pre-Alarm level = 125
8
Current load < Main Margin
no
yes
9
Main Alarm level = 0
10
Main Alarm level = Current load – Main Margin
11
Current load < Pre-Margin
no
yes
12
Pre-Alarm level = 0
13
Pre-Alarm level = Current load – Pre-Margin

Fig. 2

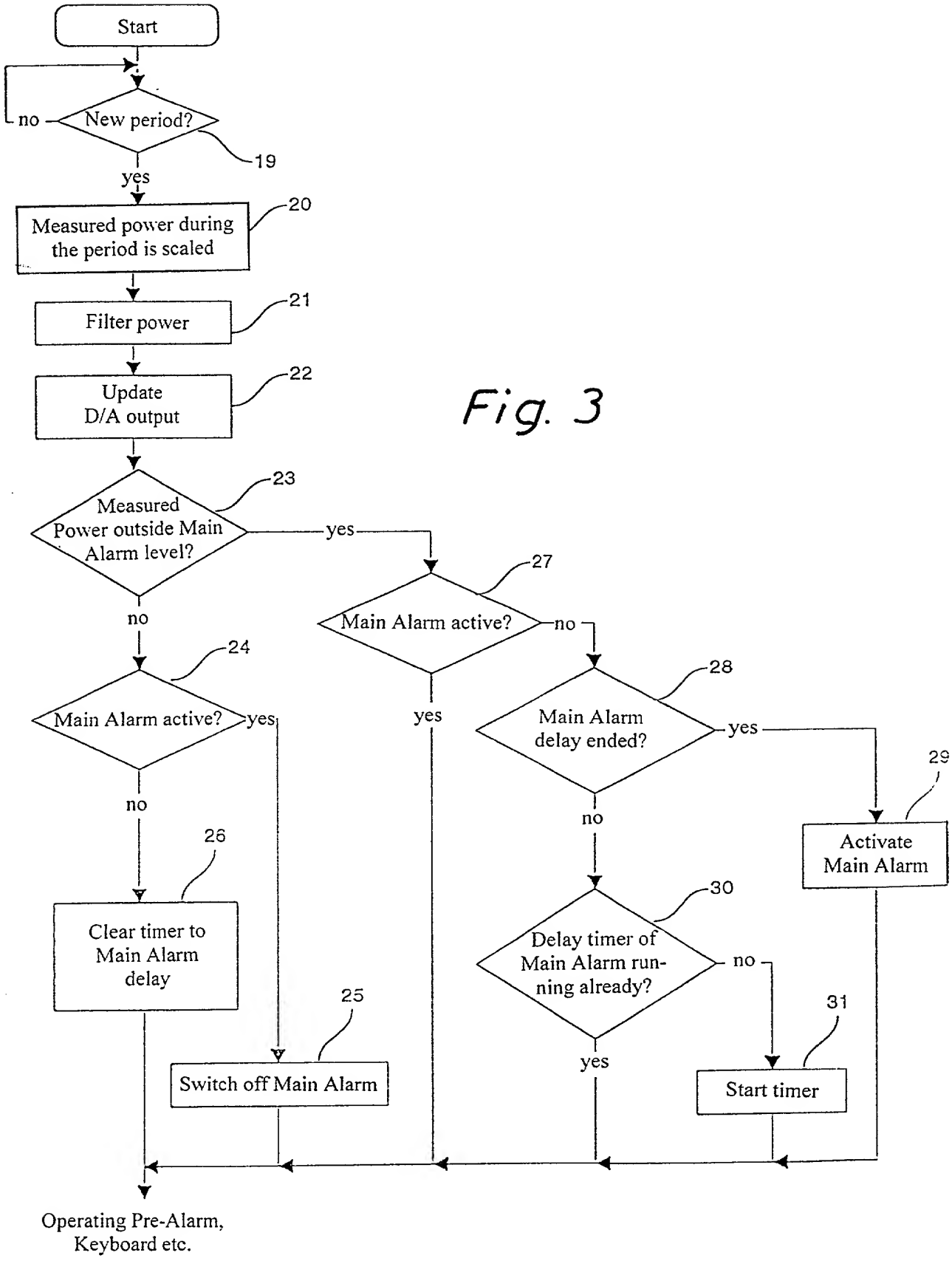
Start
New period?
no
yes
19
Measured power during the period is scaled
20
Filter power
21
Update D/A output
22
Measured Power outside Main Alarm level?
23
yes
no
Main Alarm active?
24
yes
no
Clear timer to Main Alarm delay
26
Switch off Main Alarm
25
Main Alarm active?
27
no
yes
Main Alarm delay ended?
28
yes
no
Activate Main Alarm
29
Delay timer of Main Alarm running already?
30
no
yes
Start timer
31
Operating Pre-Alarm, Keyboard etc.

Fig. 3

Page 1 of 2 Pages [ ] Original [ ] Substitute [ ] Supplemental Atty. Docket:

Combined Declaration for Patent Application and Power of Attorney

As a below-named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name; and that I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

LOAD INDICATOR

the specification of which (check one)

[X] is attached hereto;

[ ] was filed in the United States under 35 U.S.C. §111 on _____, as U.S. Appln. No. _____*; or

[ ] was/will be filed in the U.S. under 35 U.S.C. §371 by entry into the U.S. national stage of an international (PCT) application, PCT/_____; filed _____, entry requested on _____*; national stage application received U.S. Appln. No. _____*; §371/§102(e) date _____* (* if known)

and was amended on _____ (if applicable).

(include dates of amendments under PCT Art. 19 and 34 if PCT)

I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above; and I acknowledge the duty to disclose to the Patent and Trademark Office (PTO) all information known by me to be material to patentability as defined in 37 C.F.R. §1.56.

I hereby claim foreign priority benefits under 35 U.S.C. §§ 119 and 365 of any prior foreign application(s) for patent or inventor's certificate, or prior PCT application(s) designating a country other than the U.S., listed below with the "Yes" box checked and have also identified below any such application having a filing date before that of the application on which priority is claimed:

(Number)	(Country)	(Day Month Year Filed)	[X] YES	[ ] NO
9703952-3	Sweden	28 October 1997		
(Number)	(Country)	(Day Month Year Filed)	[ ] YES	[ ] NO

I hereby claim the benefit under 35 U.S.C. §120 of any prior U.S. non-provisional application(s) or prior PCT application(s) designating the U.S. listed below, or under §119(e) of any prior U.S. provisional applications listed below, and, insofar as the subject matter of each of the claims of this application is not disclosed in such U.S. or PCT application in the manner provided by the first paragraph of 35 U.S.C. §112, I acknowledge the duty to disclose to the PTO all information as defined in 37 C.F.R. §1.56(a) which occurred between the filing date of the prior application and the national filing date of this application:

(Application No.)	(Day Month Year Filed)	(Status: patented, pending, abandoned)
SE98/01909	22 October 1998	
(Application No.)	(Day Month Year Filed)	(Status: patented, pending, abandoned)
(Application No.)	(Day Month Year Filed)	(Status: patented, pending, abandoned)

As a named inventor, I hereby appoint the following registered practitioners to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

All of the practitioners associated with Customer Number 001444

Direct all correspondence to the address associated with **Customer Number 001444**; i.e.,

BROWDY AND NEIMARK, P.L.L.C.
624 Ninth Street, N.W.
Washington, D.C. 20001-5303
(202) 628-5197

The undersigned hereby authorizes the U.S. Attorneys or Agents appointed herein to accept and follow instructions from _____ as to any action to be taken in the U.S. Patent and Trademark Office regarding this application without direct communication between the U.S. Attorneys or Agents and the undersigned. In the event of a change of the persons from whom instructions may be taken, the U.S. Attorneys or Agents appointed herein will be so notified by the undersigned.

Atty. Docket:

Title: LOAD INDICATOR

U.S. Application filed _____, Serial No. _____

PCT Application filed 22 October 1998, Serial No. SE98/01909

I hereby further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. §1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

FULL NAME OF FIRST INVENTOR	INVENTOR'S SIGNATURE	DATE
Lars-Olof OLOFSSON		04/18/2000
RESIDENT: Holm, Sweden	CITIZENSHIP: Swedish	
POST OFFICE ADDRESS: Klockarevägen 3, 302 79 HOLM, SWEDEN		
FULL NAME OF SECOND JOINT INVENTOR	INVENTOR'S SIGNATURE	DATE
Martin RANGER		04/18/2000
RESIDENT: Helsingborg, Sweden	CITIZENSHIP: Swedish	
POST OFFICE ADDRESS: Lägervägen 19 B, 254 56 HELSINGBORG, SWEDEN		
FULL NAME OF THIRD JOINT INVENTOR	INVENTOR'S SIGNATURE	DATE
Per ZELLMAN		04/18/2000
RESIDENT: Helsingborg, Sweden	CITIZENSHIP: Swedish	
POST OFFICE ADDRESS: Tågagatan 31, 254 39 HELSINGBORG, SWEDEN		
FULL NAME OF FOURTH JOINT INVENTOR	INVENTOR'S SIGNATURE	DATE
RESIDENT	CITIZENSHIP	
POST OFFICE ADDRESS		
FULL NAME OF FIFTH JOINT INVENTOR	INVENTOR'S SIGNATURE	DATE
RESIDENT	CITIZENSHIP	
POST OFFICE ADDRESS		
FULL NAME OF SIXTH JOINT INVENTOR	INVENTOR'S SIGNATURE	DATE
RESIDENT	CITIZENSHIP	
POST OFFICE ADDRESS		
FULL NAME OF SEVENTH JOINT INVENTOR	INVENTOR'S SIGNATURE	DATE
RESIDENT	CITIZENSHIP	
POST OFFICE ADDRESS		

ALL INVENTORS MUST REVIEW APPLICATION AND DECLARATION BEFORE SIGNING ALL ALTERATIONS MUST BE INITIALED AND DATED BY ALL INVENTORS PRIOR TO EXECUTION NO ALTERATIONS CAN BE MADE AFTER THE DECLARATION IS SIGNED ALL PAGES OF DECLARATION MUST BE SEEN BY ALL INVENTORS